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6. AUTHOR(S)

Dr William J. Schwartz

2312

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Univ of Mass Medical Center
Gordon Research Conferences, Inc.
55 Lake Avenue, North
Worcester, MA 01655

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AFOSR/NL
110 DUNCAN AVE SUITE B115
BOLLING AFB DC 20332-0001
Dr Haddad

93-26216



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The Gordon Research Conference on Chronobiology was held from August 9, 13, 1993 at Colby-Sawyer College, New London, New Hampshire. There were 169 applications to attend (to my knowledge, the largest number since the Chronobiology conference began in 1978). Of the 150 which could be accommodated and accepted, a total of 143 ultimately attended (Appendix A). Conferees came from 24 states; a little over 20% of the total represented 13 foreign countries, including two from former East Bloc nations; and nearly 30% of the participants were women. Graduate students, post-doctoral fellows, junior investigators, and senior scientists were all represented. Report contains full program and complete list of attendees.

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1993 Gordon Research Conference on Chronobiology

Final Report

Air Force Office of Scientific Research, Grant F49620-93-1-0247

William J. Schwartz, Chair

The Gordon Research Conference on Chronobiology was held from August 9 - 13, 1993 at Colby-Sawyer College, New London, New Hampshire. There were 169 applications to attend (to my knowledge, the largest number since the Chronobiology conference began in 1978). Of the 150 which could be accommodated and accepted, a total of 143 ultimately attended (Appendix A). Conferees came from 24 states; a little over 20% of the total represented 13 foreign countries, including two from former East Bloc nations; and nearly 30% of the participants were women. Graduate students, post-doctoral fellows, junior investigators, and senior scientists were all represented.

The study of biological timekeeping is now at a particularly fertile stage, encompassing multiple levels of biological organization, recruiting a wide array of disciplines and methodologies, and uniting a host of investigators, from plant geneticists to clinical psychiatrists. This vigor was reflected in the program (Appendix B), which consisted of 24 speakers, 9 discussion leaders, and 4 senior scientists as evening "commentators."

Two sessions on the first day focused on transcriptional and translational mechanisms of circadian rhythmicity, with discussions of putative "clock genes" in cyanobacteria, algae, fungi, fruitflies, and hamsters. The discoveries of prokaryotic circadian rhythmicity, time-dependent phosphorylation of the *per* protein, and rhythmic gene products in *per*⁰ flies - to name only a few examples - clearly pose new challenges to our understanding of circadian oscillators. Two sessions on the second day addressed cellular analyses, including work on photoreceptors in frogs, neurons in molluscs, testis in moths, and immortalized suprachiasmatic nucleus cells from rats. The characterization of a clock-like defecation rhythm in *Caenorhabditis elegans* was exciting, since this model organism, with its powerful genetics and cell biology, may now prove useful in studies of biological rhythmicity. Two sessions on the third day considered clocks as physiological systems, complete with inputs for entrainment and outputs for the overt manifestation of rhythmicity. Remarkable progress included the demonstration that multiple oscillators exist within individual unicells, the role of the intergeniculate leaflet in mediating non-photic entrainment in mammals, and the likelihood that the suprachiasmatic nucleus communicates its timing signal to the rest of the brain by multiple mechanisms. The final three sessions on the last two days were devoted to specific topics. First, new methods for investigating the circadian clock in the suprachiasmatic nucleus were introduced, including infusion of antisense nucleotides, studies of immediate early gene expression, and imaging of intracellular Ca²⁺ concentrations. A session on photoperiodism ranged from cellular studies in *Gonyaulax* to maternal-fetal communication in rodents. The final session on

temperature and timekeeping included instructive presentations using chick pineal cells, social activity of voles, and hibernation in squirrels and bears. These examples demonstrated that the temperature compensation of the circadian pacemaker's free-running period need not imply a temperature insensitivity of the pacemaker's amplitude or of the entire circadian timekeeping system.

Poster sessions were also part of the formal activities of the conference. A total of 55 posters were organized by the Vice-Chair into two sessions (Appendix C), allowing participants a valuable overview as well as detailed information regarding many different research programs.

Throughout the conference, discussion was particularly animated, stimulating, and extensive. The atmosphere was conducive to the cross-fertilization and integration of disciplines, experimental approaches, and model organisms. These features contributed importantly to the success of the conference, as evaluated by the attendees (Appendix D). It is obvious from these comments that the Gordon Research Conference on Chronobiology continues to play a crucial role in the field, and the participants unanimously voted their desire to hold another conference in 1995.

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APP. (A)

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COLBY SAWYER SOUTH

CHRONOBIOLOGY
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NAME AND ADDRESS

ROOM #
BUS TEL.

GUEST NAMES

DR NEIL ARONIN
UNIV. OF MASS. MEDICAL SCHOOL
UMMS, DEPT. OF MEDICINE
55 LAKE AVENUE NORTH
WORCESTER MA

A 306
508-86-3239
ATTENDEE

01655

A KEITH BARRETT
NORTHWESTERN UNIVERSITY
NSF CENTER FOR BIOLOGICAL TIMING
2153 NORTH CAMPUS DRIVE
EVANSTON IL

M 8
708-491-8303
ATTENDEE

60208

DR STEPHANY M BIELLO
UNIVERSITY OF TORONTO
DEPT. OF ZOOLOGY
25 HARBORD STREET
TORONTO, ONTARIO CANADA

P 200
416-978-8506
ATTENDEE

M5S 1A1

DR ERIC L BITTMAN
UNIVERSITY OF MASSACHUSETTS AT AMHERST
DEPT. OF BIOLOGY MORRILL SCIENCE CENTER
AMHERST MA

M 10
413-545-4344
ATTENDEE

01003

DR GENE D BLOCK
DEPT. OF BIOLOGY UNIV. OF VIRGINIA
GILMER HALL
UNIVERSITY OF VIRGINIA
CHARLOTTESVILLE VA

M 12
804-982-5480
SPEAKER

22901

DR GERARD J BOER
NETHERLANDS INSTITUTE FOR BRAIN RESEARCH
MEIBERGDRIEP 33
AMSTERDAM
THE NETHERLANDS

C 209
312056,65509
ATTENDEE

1105 AZ

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CHRONOBIOLOGY
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NAME AND ADDRESS	ROOM # BUS TEL.	GUEST NAMES
DR CHRIS T BOND OREGON HEALTH SCI. UNIV., VOLLUM INST FOR ADV. BIOMED. RES., 3181 SOUTHWEST SAM JACKSON PARK ROAD MAIL CODE L-474 PORTLAND OR	P 212 503-494-5451 ATTENDEE 97201-3098	
DR DIANE BORRIN X	C 206 ATTENDEE	
DR STUART BRODY BIOLOGY DEPARTMENT UCSD LA JOLLA CA	M 7 619-534-2619 ATTENDEE 92093	
DR MAJA BUCAN UNIVERSITY OF PENNSYLVANIA 111 A CRB, 422 CURIE BLVD. PHILADELPHIA PA	P 207 215-898-0020 ATTENDEE 19104	
DR GREGORY M CAHILL UNIV. OF KANSAS MEDICAL CENTER DEPT. OF ANATOMY & CELL BIOLOGY 3901 RAINBOW BLVD. KANSAS CITY KS	M 15 913-588-2716 SPEAKER 66160-7400	
DR IAIN C CAMPBELL INST. OF PSYCHIATRY DEPT. OF NEUROSCIENCE DECREPIGNY PARK LONDON UK	M 9 71 7035411 ATTENDEE SE5 8AF	

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NAME AND ADDRESS

ROOM #
BUS TEL.

GUEST NAMES

DR MONA E CASTEL
HEBREW UNIVERSITY
CELL & ANIMAL BIOLOGY
LIFE SCIENCES
JERUSALEM
ISRAEL

P 304
02-585945
ATTENDEE
91904

DR CHRIS C CHABOT
PLYMOUTH STATE COLLEGE
DEPARTMENT OF NATURAL SCIENCES
BOYD HALL
PLYMOUTH NH

M 7
603-535-2864
ATTENDEE
03264

DR KATRIN F CHUA
HARVARD MEDICAL SCHOOL
PROGRAM IN NEUROSCIENCE
DEPARTMENT OF NEUROBIOLOGY, EGRF-360
BOSTON MA

P 209
432-0323
ATTENDEE
02115

DR GRAHAM J COLEMAN
LA TROBE UNIVERSITY
DEPT. OF PSYCHOLOGY
BUNDOORA, VIC
AUSTRALIA

M 9
6134792947
ATTENDEE
3083

DR JAMES C COMELLI
HARVARD UNIVERSITY
DEPT OF CELLULAR & DEVEL. BIO
BOX 35 BIO LAB, 16 DIVINITY AVE
CAMBRIDGE MA

C 106
617-495-3716
ATTENDEE
02138

DR GARY G COTE
THE UNIVERSITY OF CONNECTICUT
DEPT. OF MOLECULAR & CELL BIOLOGY, U-125
75 NORTH EAGLEVILLE ROAD
STORRS CT

M 11
203-486-4351
ATTENDEE
06269-3125

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COLBY SAWYER SOUTH

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NAME AND ADDRESS

ROOM #
BUS TEL.

GUEST NAMES

DR CHARLES Y CZEISLER
BRIGHAM AND WOMEN'S HOSPITAL
LAB FOR CIRCADIAN AND SLEEP DISORDERS
ENDOCRINE DIVISION, 221 LONGWOOD AVENUE
BOSTON MA 02115

M 16
617-732-4933
SPEAKER

DR SERGE DAAN
UNIVERSITY GRONINGEN
ZOOLOGICAL LABORATORY
P.O. BOX 14
HAREN 9750 AA
NETHERLANDS

M 5
31-50-632046
DISC LDR

DR FRED C DAVIS
NORTHWESTERN UNIVERSITY
DEPT. OF BIOLOGY
414 MUGAR BLDG
BOSTON MA 02115

M 11
617-437-4039
DISC LDR

DR PATRICIA J DE COURSEY
UNIVERSITY OF SOUTH CAROLINA
DEPT OF BIOLOGICAL SCIENCES
SUMTER AND GREENE STREETS
COLUMBIA SC 29208

P 303
803-777-3934
ATTENDEE

DR HORAUO D DE LA IGLESIA
UNIV. OF MASSACHUSETTS, AMHERST
BIOLOGY DEPT.
MORRILL SCIENCE BUILDING
AMHERST MA 01002

M 5
413-545-4344
ATTENDEE

DR ANTONI DIEZ-NOGUERA
UNIVERSITY OF BARCELONA
LABORATORY DE FISILOGIA
FACULTAT DE FARMACIA, AV JOAN XXIII S/N
BARCELONA 08028
SPAIN

OFF
3434907869
ATTENDEE

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ROOM #
BUS TEL.

GUEST NAMES

DR JEANNE F DUFFY
NORTHEASTERN UNIVERSITY
LAB FOR CIRCADIAN MEDICINE-BRIGHAM &
WOMEN'S HOSP, 221 LONGWOOD AVENUE RM 454
BOSTON MA

P 300
617-732-7995
ATTENDEE
02115-5817

DR JAY C DUNLAP
DARTMOUTH MEDICAL SCHOOL
DEPT. OF BIOCHEMISTRY
7200 VAIL, RM 413
HANOVER NH

C 207
603-650-1108
ATTENDEE
03755-3844

DR DAVID J EARNEST
UNIV OF ROCHESTER SCHOOL OF MEDICINE
DEPT OF NEUROBIOLOGY & ANATOMY BOX 603
601 ELMWOOD AVE
ROCHESTER NY

C 212
716-275-6117
SPEAKER
14642

DR TAKASHI EBISAWA
275 BROADWAY, LEFT SIDE
ARLINGTON MA

M 6
617-726-8
ATTENDEE
02174

DR ISAAC EDERY
BRANDEIS UNIVERSITY AND HHMI
DEPT. OF BIOLOGY, 235 BASSINE
BRANDEIS UNIVERSITY
WALTHAM MA
USA

M 17
617-736-3161
ATTENDEE
02254

DR LELAND N EDMUNDS
STATE UNIVERSITY OF NEW YORK/STONY BROOK
DIV. OF BIOLOGICAL SCIENCES
LIFE SCI. BLDG., ROOM 370
STONY BROOK NY

A 304
516-632-8537/8
ATTENDEE
11794

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NAME AND ADDRESS

ROOM #
BUS TEL.

GUEST NAMES

DR JEFFREY A ELLIOTT
UNIVERSITY OF CALIFORNIA SAN DIEGO
DEPARTMENT OF PSYCHIATRY 0667
CIRCADIAN PACEMAKER LAB 9500 GILMAN DR
LA JOLLA CA

M 18
619-534-7191
ATTENDEE
92093-0667

DR MARK G ERLANDER
THE SCRIPPS RESEARCH INSTITUTE
DEPARTMENT OF MOLECULAR BIOLOGY, MB-10
10666 NORTH TORREY PINES ROAD
LA JOLLA CA

M 18
619-554-4314
ATTENDEE
92037

DR ARNOLD ESKIN
UNIVERSITY OF HOUSTON
DEPARTMENT OF BIOCHEMISTRY
HOUSTON TX

C 210
713-743-8381
CHAIRMAN
77204-5934

DR JERRY F FELDMAN
UNIV. OF CALIF. SANTA CRUZ
BIOLOGY DEPARTMENT
SANTA CRUZ CA

C 208
408-459-2604
DISC LDR
95064

DR BRIGITTE FRISCH
BRANDEIS UNIVERSITY
DEPARTMENT OF BIOLOGY
235 BASSINE
WALTHAM MA

P 201
617-736-3172
SPEAKER
02254

DR BEATRIZ FUENTES-PARDO
UNIV. NACIONAL AUTONOMA DE MEXICO
DEPARTAMENTO DE FISIOLOGIA, FAC. DE MED.
APDO. POSTAL NO. 70-250
MEXICO, D.F.
MEXICO

P 303
525-623-2362
ATTENDEE
04510

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NAME AND ADDRESS

ROOM #
BUS TEL.

GUEST NAMES

DR ROBERT L GANNON
CIRCADAIN NEUROBIOLOGY RESEARCH GROUP
ARMSTRONG LABORATORY (CFTO)
2504 D DR. STE. 1
BROOKS AFB TX

78235

M 14
210-536-3814
ATTENDEE

DR MENNO P GERKEMA
GRONINGEN UNIVERSITY
ZOOLOGY LABORATORY
P.O. BOX 14, NL 9750 AA HAREN
HAREN
THE NETHERLANDS

NL 9750 AA

C 304
31-50-632027
SPEAKER

DR MICHAEL E GEUSZ
UNIVERSITY OF VIRGINIA
DEPARTMENT OF BIOLOGY
GILMER HALL
CHARLOTTESVILLE VA

22903

M 14
804-982-5481
ATTENDEE

DR JADWIGA M GIEBULTOWICZ
UNIVERSITY OF MARYLAND/USDA
10300 BALTIMORE BLVD BLG 306 RM 322
BARC-EAST USDA/ARS/BA INS. NEUR.HOR. LAB
BELTSVILLE MD

20705-2350

P 203
301-504-8038
SPEAKER

DR MARTHA U GILLETTE
UNIVERSITY OF ILLINOIS
DEPT. OF CELL & STRUCTURAL BIOLOGY
506 MORRILL HALL, 505 S. GOODWIN AVENUE
URBANA IL

61801

P 202
217-244-1355
DISC LDR

DR VAN D GOOCH
UNIVERSITY OF MINNESOTA-MORRIS
DIVISION OF SCIENCE & MATH
MORRIS MN

56267

M 19
612-589-6372
ATTENDEE

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NAME AND ADDRESS

ROOM #
BUS TEL.

GUEST NAMES

DR MICHAEL R GORMAN
UNIVERSITY OF CALIFORNIA AT BERKELEY
DEPARTMENT OF PSYCHOLOGY
BERKELEY CA

94720

M 19
510-642-5888
ATTENDEE

DR LAUREL L HAAK
STANFORD UNIVERSITY
DEPT. OF BIOLOGICAL SCIENCES
GILBERT HALL BOX 116
STANFORD CA

94305-5020

P 212
415-723-9709
ATTENDEE

DR GENEVEIVE M HADDAD
AIR FORCE OFFICE OF SCIENTIFIC RESEARCH
AFORSR/NL BOLLING AFB DC 20332-0001
110 DUNCAN AVENUE SUITE B 115
WASHINGTON DC

20332-0001

P 301
202-767-5021
ATTENDEE

DR RUDIGER HARDELAND
I. ZOOLOGISCHES INSTITUT
UNIVERSITAT GOTTINGEN
BERLINER STR. 28, D-3400
GOTTINGEN
GERMANY

C 305
+551-395414
SPEAKER

DR PAUL E HARDIN
TEXAS A&M UNIVERSITY
DEPARTMENT OF BIOLOGY AND CENTER FOR
ADVANCED INVERT MOLECULAR SCIENCE
COLLEGE STATION TX

77843-3258

C 101
409-845-7756
ATTENDEE

DR JACOB P HARNEY
UNIV. OF KENTUCKY, COLLEGE OF MED.
DEPT. OF PHYSIOLOGY
M531 MEDICAL CENTER
LEXINGTON KY

40536-0084

C 101
410-706-6028
ATTENDEE

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93-S-CSS-9
COLBY SAWYER SOUTH

CHRONOBIOLOGY
AUG-08-93

NAME AND ADDRESS

ROOM #
BUS TEL.

GUEST NAMES

DR MICHAEL H HASTINGS
UNIVERSITY OF CAMBRIDGE
DEPARTMENT OF ANATOMY
CAMBRIDGE
UK

CB2 3DY

M 10
SEE COMMENTS
ATTENDEE

DR J. WOODLAND HASTINGS
HARVARD UNIVERSITY
16 DIVINITY AVENUE
DEPT. OF CELLULAR & DEVELOPMENTAL BIOLOG
CAMBRIDGE MA

02138

C 104
617-495-3714
DISC LDR

DR MICHAELA HAU
MAX-PLANCK-INSTITUT
FUR VERHALTENSPHYSIOLOGIE
VON-DER-TANN-STR 7 ABT. PROF GWINNER
8138 ANDECHS
GERMANY

8138

P 306
08152/373-17
ATTENDEE

DR SABINE HEIGL
MAX-PLANCK-INSTITUT
FUR VERHALTENSPHYSIOLOGIE
VON-DER-TANN-STR 7 ABT. PROF GWINNER
8138 ANDECHS
GERMANY

8138

P 306
08152/373-37
ATTENDEE

DR H. CRIG HELLER

C

C 102

ATTENDEE

DR MARTHA HOTZ VITATERNA
NORTHWESTERN UNIVERSITY
DEPT OF NEUROBIOLOGY & PHYSIOLOGY 2153 N
CAMPUS DRIVE, NSF CTR FOR BIOL. TIMING
EVANSTON IL

60208

P 302
708-491-8303
ATTENDEE

10-AUG-93
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93-S-CSS-9
COLEY SAWYER SOUTH

CHRONOBIOLOGY
AUG-08-93

NAME AND ADDRESS

ROOM #
BUS TEL.

GUEST NAMES

DR MARK W HURD
UNIVERSITY OF TORONTO
DEPARTMENT OF PSYCHOLOGY
100 ST GEORGE STREET
TORONTO
CANADA

MSS 1A1

MC 2
416-978-3433
ATTENDEE

DR HELENA ILLNEROVA
ACADEMY OF SCI. OF THE CZECH REPUBLIC
INSTITUTE OF PHYSIOLOGY
VIDENSKA 1083
PRAGUE 4
CZECH REPUBLIC

14220

P 300
4721151
ATTENDEE

DR NORIO K ISHIDA
NATIONAL INSTITUTE OF BIOSCIENCE
AND HUMAN TECHNOLOGY
1-13 TSUKUBA SCIENCE CITY305
SCIENCE CITY305
JAPAN

305

C 104
81-298-54-6072
ATTENDEE

DR MASAHITO ISHIUYA
NATIONAL INST FOR BASIC BIOLOGY
DEPT OF CELL BIOLOGY
NISHIGO-RAKA, MYODAIZI-CHO
OKAZAKI AICHI
JAPAN

444

C 103
ATTENDEE

DR BALZER IVONNE
I. ZOOLOGISCHES INSTITUT
UNIVERSITY OF GOETTINGEN
BERLIN STR 28
GOETTINGEN
GERMANY

37073

P 308
ATTENDEE

DR DANIEL S JANIK
UNIVERSITY OF TORONTO
DEPARTMENT OF ZOOLOGY
25 HARBORD STREET
TORONTO
CANADA

MSS 1A1

C 106
416-978-8506
SPEAKER

CONFERENCE REGISTRATION LIST

93-S-CSS-9
COLBY SAWYER SOUTH

CHRONOBIOLOGY
AUG-08-93

NAME AND ADDRESS

ROOM #
BUS TEL.

GUEST NAMES

DR AMY E JETTON
UNIVERSITY OF MASSACHUSETTS
DEPT. OF BIOLOGY
MORRILL SCIENCE CENTER
AMHERST MA

01003

P 302
413-545-4344
ATTENDEE

DR MEGAN E JEWETT
HARVARD UNIVERSITY
PIERCE HALL ROOM 318
DIVISION OF APPLIED SCIENCES
CAMBRIDGE MA

02138

C 203
617-495-3789
ATTENDEE

DR CARL H JOHNSON
VANDERBILT UNIVERSITY
DEPARTMENT OF BIOLOGY, BOX 1812-B
NASHVILLE TN

37235

C 310
615-322-2384
ATTENDEE

DR JANET E JOY
NIMH (NIH)
NIMH NEUROSCIENCES CENTER
LABORATORY OF BIOCHEMICAL GENETICS
WASHINGTON DC

20032

C 206
202-373-6037
ATTENDEE

DR SAT BIR S KHALSA
UNIVERSITY OF VIRGINIA
NSF CENTER FOR BIOLOGICAL TIMING
DEPT. OF BIOLOGY, GILMER HALL
CHARLOTTESVILLE VA

22901

C 303
804-982-5481
ATTENDEE

DR THOMAS S KILDUFF
STANFORD UNIVERSITY SCHOOL OF MEDICINE
SLEEP RESEARCH CENTER
DEPT. OF PSYCHIATRY TD-114
STANFORD CA

94305

C 301
415-723-9380
ATTENDEE

10-AUG-93
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93-S-CSS-9
COLBY SAWYER SOUTH

CHRONOBIOLOGY
AUG-08-93

NAME AND ADDRESS

ROOM #
BUS TEL.

GUEST NAMES

DR TAKAO KONDO
NATIONAL INSTITUTE FOR BASIC BIOLOGY
MYODAIJI
OKAZAKI
JAPAN

444

C 103
81-564-55-7603
SPEAKER

DR JON M KORNHAUSER
NORTHWESTERN UNIVERSITY
DEPT. OF NEUROBIOLOGY AND PHYSIOLOGY
2153 SHERIDAN ROAD
EVANSTON IL

60208

M 8
708-491-2872
SPEAKER

DR CONSTANTINOS KOUMENIS
UNIVERSITY OF HOUSTON
DEPT. OF BIOCHEM. AND BIOPHYSICS SCI.
3201 CULLEN BLVD.
HOUSTON TX
USA

77004

C 302
713-743-8388
ATTENDEE

DR DANIEL F KRIPKE
UNIVERSITY OF CALIFORNIA, SAN DIEGO
9500 GILMAN DRIVE, 0667
LA JOLLA CA

92093-0667

C 302
619-554-7131
ATTENDEE

DR JENNIFER J LAROS
DARTMOUTH MEDICSL SCHOOL
DEPT. OF BIOCHEMISTRY
7200 VAIL ROOM 413
HANOVER NH

03755-3844

C 207
603-650-1154
ATTENDEE

DR THERESA M LEE
UNIVERSITY OF MICHIGAN
3042 NEUROSCIENCE LAB BLDG
1103 E. HURON ST
ANN ARBOR MI

48103-1687

P 210
313-936-1495
SPEAKER

10-AUG-93
E171

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PAGE 13

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93-S-CSS-9
COLBY SAWYER SOUTH

CHRONOBIOLOGY
AUG-08-93

NAME AND ADDRESS	ROOM # BUS TEL.	GUEST NAMES
DR MICHAEL T LEWIS UNIVERSITY OF CALIFORNIA, SANTA CRUZ SINSHEIMER LABS. DEPT. OF BIOLOGY SANTA CRUZ CA 95064	A 204 408-459-4225 ATTENDEE	
DR DENNIS W LIU UNIVERSITY OF WASHINGTON DEPARTMENT OF GENETICS, SK50 SEATTLE WA 98195	C 306 206-543-3117 SPEAKER	
DR ROBERT LYNCH UNIVERSITY OF COLORADO ENVIRONMENTAL, POPULATION & ORGANISMIC B BOULDER CO 80309-0334	A 110 303-492-7056 ATTENDEE	
DR ROB MC CLUNG DARTMOUTH COLLEGE DEPT. OF BIOLOGICAL SCIENCES GILMAN 6044 HANOVER NH 03755	A 207 503-646-3940 ATTENDEE	
DR MARIJA MEDANIC UNIV. OF INNINOIS, UIUC 524 BURHILL HALL 407. S. GOODWIN AVENUE URBANA IL 61204	C 214 217-244-1842 ATTENDEE	
DR MICHAEL MENAKER UNIVERSITY OF VIRGINIA DEPT. OF BIOLOGY, GILMER HALL CHARLOTTESVILLE VA 22903	A 214 804-982-5767 DISC LDR	

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NAME AND ADDRESS

ROOM #
BUS TEL.

GUEST NAMES

DR MARTHA W MERROW
DARTMOUTH MEDICAL SCHOOL
DEPT. BIOCHEMISTRY
HB 7200
HANOVER NH

C 203
603-650-1120
ATTENDEE

03755-3844

DR ELIZABETH L MEYER
DEPT. OF PSYCHIATRY & BEHAVIORAL SCIENCE
HEALTH SCIENCE CENTER, SUNY
STONY BROOK NEW YORK 11794

P 200
516-444-1614
ATTENDEE

DR STEPHAN H MICHEL
UNIVERSITY OF VIRGINIA
DEPT. OF BIOLOGY
GILMER HALL, R285
CHARLOTTESVILLE VA

C 303
804-982-5481
ATTENDEE

22903

DR ERIC M MINTZ
UNIVERSITY OF CALIFORNIA SANTA CRUZ
DEPARTMENT OF BIOLOGY
SANTA CRUZ CA

A 207
408-459-2745
ATTENDEE

95064

DR MARIA MITTAG
HARVARD UNIVERSITY
DEPT OF CELL & DEVEL. BIOLOGY
16 DIVINITY AVE
CAMBRIDGE MA

P 205
617-495-3716
SPEAKER

02138

DR MARGARET M MOGA
UNIV OF PITTSBURGH
CENTER FOR NEUROSCIENCE
BST W1601
PITTSBURGH PA

P 305
412-648-9873
ATTENDEE

15261

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NAME AND ADDRESS

ROOM #
BUS TEL.

GUEST NAMES

DR ROBERT Y MOORE
UNIVERSITY OF PITTSBURGH
CENTER FOR NEUROSCIENCE
BST W1656
PITTSBURGH PA

15217

A 212
412-648-8322
SPEAKER

DR LARRY MORIN
SUNY
HEALTH SCIENCE CENTER
DEPT. PSYCHIATRY
STONY BROOK NY

11794

A 216
516-444-1613
ATTENDEE

DR MARY E MORRIS
HARVARD MEDICAL SCHOOL
DEPARTMENT OF NEUROBIOLOGY
220 LONGWOOD AVENUE
BOSTON MA

02115

P 209
617-432-0323
ATTENDEE

DR NICHOLAS MROSOVSKY
UNIVERSITY OF TORONTO
DEPT. OF ZOOLOGY
TORONTO ONTARIO
CANADA

M5S 1A1

A 216
416-978-8506
ATTENDEE

DR MARTA B NUNEZ-REGUEIRO
UNIVERSITY OF HOUSTON
DEPT. OF BIOCHEM. AND BIOPHYSICS SCI.
HSC BLDG. #402
HOUSTON TX
USA

77204-5934

C 210
713-743-8382
ATTENDEE

DR PATRICK J O'CONNOR
THE UNIVERSITY OF GEORGIA
DEPT OF EXERCISE SCIENCE
ATHENS GA

30602-3654

A 213
706-542-4382
ATTENDEE

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DR TERRY L PAGE VANDERBILT UNIVERSITY DEPARTMENT OF BIOLOGY, BOX 42B NASHVILLE TN 37235	C 310 615-322-2256 ATTENDEE	
DR GARY E PICKARD UNIVERSITY OF PENNSYLVANIA DEPT. OF PSYCHIATRY 422 CURIE BLVD. PHILADELPHIA PA 19104-6141	A 209 215-898-0787 ATTENDEE	
DR COLIN S PITTENDRIGH NSF CENTER FOR BIOLOGICAL TUNING 2309 FAIRWAY DRIVE BOZEMAN MT 59715	B 105 406-587-2005 DISC LDR	
DR BERNARD P POSSIDENTE SKIDMORE COLLEGE BIOLOGY DEPARTMENT NORTH BROADWAY SARATOGA SPRINGS NY 12866	OFF 518-584-5000 ATTENDEE	
DR JEFFREY L PRICE ROCKEFELLER UNIVERSITY 1230 YORK AVE. DR. MICHAEL YOUNG'S LAB NEW YORK NY 10021	A 213 212-327-8654 ATTENDEE	
DR WOLFGANG PUCHALSKI WESLEYAN UNIVERSITY DEPARTMENT OF BIOLOGY MIDDLETOWN CT 06549	A 110 203-347-9411 ATTENDEE	

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ROOM #
BUS TEL.

GUEST NAMES

DR ARCADY A PUTILOV
INSTITUTE OF PHYSIOLOGY S.B. RAMS
2 TIMAKOVA STR
NOVOSIFIRSK
NOVOSIFIRSK RUSSIA
RUSSIA

MC 6
73832358048
ATTENDEE

630117

DR MICHAEL A REA
ARMSTRONG LABORATORY
AL/CFTO
BEOOKS AFB TX

A 209
210-536-2194
ATTENDEE

78235

DR UWE REDLIN
WESLEYAN UNIVERSITY
DEPT. OF BIOLOGY
LAWN AVENUE
MIDDLETOWN CT

A 309
203-347-9411
ATTENDEE

06459-0170

DR JENNY R REDMAN
DEPT. OF PSYCHOLOGY, MONASH UNIVERSITY
WELLINGTON RD, CLAYTON, VICTORIA 3168
VICTORIA
AUSTRALIA

P 308
03-565-3957
ATTENDEE

DR STEPHAN G REEBS
UNIV. OF DE MONCTON
DEPT. DE BIOLOGIE
MONCTON
MONCTON NB
CANADA

A 301
506-858-4384
ATTENDEE

E1A 3E9

DR LUDGER RENSING
UNIVERSITY OF BREMEN DEPT OF BIOLOGY
PO BOX 3304-40 D-2800 BREMEN
NW 2 LEOBENERSTR
2800 BREMEN 33 GERMANY

A 316
421-218-2126
ATTENDEE

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GUEST NAMES

DR STEVEN M REPPERT
MASSACHUSETTS GENERAL HOSPITAL
JACKSON 1226
BOSTON MA

02114

A 112
617-726-8450
DISC LDR

DR MICHAEL H ROBERTS
CLARKSON UNIVERSITY
DEPARTMENT OF BIOLOGY
POTSDAM NY

13699-5806

A 314
315-268-4498
ATTENDEE

DR TILL ROENNEBERG
INST. FOR MEDICAL PSYCHOLOGY
UNIV. OF MUNICH
GOETHESTR 31
MUNICH GERMANY

8000

A 107
49-89-5996650
SPEAKER

DR MICHAEL ROEBASH
HOWARD HUGHES MEDICAL INST.
BRANDEIS UNIVERSITY
DEPT. OF BIOLOGY
WALTHAM MA

02254

A 112
617-736-3160
DISC LDR

DR ALAN M ROSENWASSER
UNIVERSITY OF MAINE
DEPARTMENT OF PSYCHOLOGY, LITTLE HALL
ORONO MA

04469-5742

A 204
207-581-1954
ATTENDEE

DR FRANCOIS ROUYER
BRANDEIS UNIVERSITY- DEPT. OF BIOLOGY
415 SOUTH ST.
WALTHAM MA
USA

02254

M 17
617-736-3161
ATTENDEE

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DR NORMAN F RUBY
STANFORD UNIVERSITY
DEPT. OF BIOLOGICAL SCIENCES
GILBERT HALL
STANFORD CA

C 102
415-725-0924
ATTENDEE

94305-5020

DR PETER RUOFF
ROGALAND UNIVERSITY CENTER
P.O. BOX 2557
CHEMISTRY DEPARTMENT
STAVANGER
NORWAY

A 202
47-4-87-4777
ATTENDEE

4004

DR KATHLEEN D RYAN
UNIVERSITY OF PITTSBURGH, SCHOOL OF MED.
DEPT. OBSTETRICS, GYNECOLOGY & REPROD.
MAGEE-WOMENS HOSPITAL; FORBES AT HALKET
PITTSBURGH PA

P 204
412-641-4053
ATTENDEE

15213

DR KATHRYN SCARBOUGH
NORTHWESTERN UNIVERSITY
DEPT. NEUROBIOLOGY & PHYSIOLOGY
2153 SHERIDAN ROAD
EVANSTON IL

C 201
308-467-3245
ATTENDEE

60208-3520

DR WILLIAM J SCHWARTZ
UNIV. OF MASS. MEDICAL SCHOOL
DEPT. NEUROLOGY
55 LAKE AVE. NORTH
WORCESTER MA

MSUITE
508-856-4147
CHAIRMAN

01655

DR AMITA SEHGAL
UNIVERSITY OF PENNSYLVANIA
233 STEMMLER HALL, DEPT OF NEUROSCIENCE
36TH AND HAMILTON WALK
PHILADELPHIA PA

C 204
215-573-2985
ATTENDEE

19041

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ROOM #
BUS TEL.

GUEST NAMES

DR DONALD SHAW
THE UNIVERSITY OF CONNECTICUT
DEPT. OF PHYSIOLOGY/NEUROBIOLOGY U-154
3107 HORSEBARN HILL RD. BLDG. 4. RM. 19
STORRS CT

SEE COMMENTS
ATTENDEE

06269-4154

DR KAZUHIRO SHIMIMURA
GILMER HALL
DEPT. OF BIOLOGY
CHARLOTTESVILLE VA

A 206
804-982-5768
ATTENDEE

22901

DR DORIT SHWEIKI
HEBREW UNIVERSITY
MOLECULAR BIOLOGY DEPARTMENT
HADASSAH MEDICAL SCHOOL
JERUSALEM
ISRAEL

C 204
972-2428496
ATTENDEE

91010

DR RAE SILVER
BARNARD COLLEGE-COLUMBIA UNIVERSITY
3009 BROADWAY
PSYCHOLOGY DEPT.
NEW YORK NY

P 206
212-854-3930
ATTENDEE

10027

DR KATHLEEN K SIWICKI
SWARTHMORE COLLEGE
BIOLOGY DEPT.
500 COLLEGE AVE.
SWARTHMORE PA

P 207
215-898-0021
ATTENDEE

19081

DR JOAN G SPEH
UNIVERSITY OF PITTSBURGH
CENTER FOR NEUROSCIENCE, W1656 PSYCH.
BIOMEDICAL SCIENCE TOWER
PITTSBURGH PA

C 202
412-648-8322
ATTENDEE

15261

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GUEST NAMES

DR JOSEPH S TAKAHASHI
NORTHWESTERN UNIVERSITY
NEUROBIOLOGY & PHYSIOLOGY
2153 NORTH CAMPUS DRIVE
EVANSTON IL

A 303
708-491-4598
ATTENDEE

60208

DR JUNICHI TAKEUCHI
UNIVERSITY OF MASSACHUSETTS
MEDICAL SCHOOL, DEPT OF NEUROLOGY
55 LAKE AVENUE NORTH
WORCESTER MA

A 206
508-856-4147
ATTENDEE

01655

DR BARBARA A TATE
MIRIAM HOSPITAL & BROWN UNIVERSITY
DEPT. OF PSYCHIATRY
164 SUMMIT AVENUE
PROVIDENCE RI

BE 201
401-331-8500
ATTENDEE

02906

DR WALTER R TAYLOR
HARVARD UNIVERSITY BIOLOGICAL LABS
16 DIVINITY AVENUE
CAMBRIDGE MA

A 203
617-495-3716
ATTENDEE

02138

DR FRED W TUREK
NORTHWESTERN UNIVERSITY
2153 N. CAMPUS DRIVE
DEPARTMENT OF NEUROBIOLOGY
EVANSTON IL

A 105
708-491-2865
DISC LDR

60208

DR RUSSELL N VAN GELDER
DEPARTMENT OF BIOCHEMISTRY, STANFORD U
DEPT. OF BIOCHEM. BECKMAN CENTER B400
STANFORD UNIVERSITY SCHOOL OF MEDICINE
STANFORD CA

M 2
415-723-7596
SPEAKER

94305

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BUS TEL.

GUEST NAMES

DR OLIVIER A VAN REETH
CERB. UNIVERSITY OF BRUSSELS
HOP. ERASLE
808 ROUTE DE LENNIK
BRUSSELS
BELGIUM

1070

A 211
32-2-556427
ATTENDEE

DR ANTHONY N VANDENPOL
STANFORD UNIV. DEPT. BIOLOGY
YALE UNIV. SECT. NEUROSURGERY
333 CEDAR ST
NEW HAVEN CT

06510

A 208
203-785-5823
ATTENDEE

DR NARAYANAN VISWANATHAN
NORTHEASTERN UNIVERSITY
414 MUGAR BLDG.
DEPT. OF BIOLOGY
BOSTON MA

02115

A 210
617-437-2557
ATTENDEE

DR GARY T WASSMER
VANDERBILY UNIVERSITY
BOX 1812, STATION B, DEPT. OF BIOLOGY
390 24TH. AVE. S.
NASHVILLE TN

37235

A 205
607-322-2256
ATTENDEE

DR EDWARD T WEBER
UNIVERSITY OF ILLINOIS
DEPARTMENT OF PHYSIOLOGY
524 BURRILL HALL, 406 SOUTH GOODWIN AVE
URBANA IL

61801

C 214
217-244-1842
ATTENDEE

DR THOMAS WEHR
NATIONAL INST. OF MENTAL HEALTH
NIMH 10, 4S-239
9000 ROCKVILLE PIKE
BETHESDA MD

20892

A 312
301-496-2141
ATTENDEE

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NAME AND ADDRESS	ROOM # BUS TEL.	GUEST NAMES
DR CHARLES J WEITZ HARVARD MEDICAL SCHOOL DEPT. OF NEUROBIOLOGY, EQRF-360 220 LONGWOOD AVENUE BOSTON MA 02115	A 310 617-432-0322 ATTENDEE	
DR DAVID K WELSH HARVARD MEDICAL SCHOOL PROGRAM IN NEUROSCIENCE 220 LONGWOOD AVENUE BOSTON MA 02115	A 202 617-735-7349 ATTENDEE	
DR MALCOLM B WILKINS GLASGOW UNIV BOTANYD EPT GLASGOW UK G12 8QQ	B 216 ATTENDEE	
DR PHYLLIS M WISE UNIVERSITY OF KENTICKY SCHOOL OF MEDICINE DEPARTMENT OF PHYSIOLOGY LEXINGTON KY 40536	C 201 606-233-5254 SPEAKER	
DR JOHN C WOOLUM CALIFORNIA STATE UNIVERSITY PHYSICS DEPT. CSULA 5151 STATE UNIVERSITY DR. LOS ANGELES CA 90032	A 307 213-343-2116 ATTENDEE	
DR MICHAEL W YOUNG ROCKEFELLER UNIVERSITY HOWARD HUGHES MEDICAL INSTITUTE 1230 YOUR AVENUE NEW YORK NY 10021	A 305 212-327-8645 ATTENDEE	

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NAME AND ADDRESS	ROOM # BUS TEL.	GUEST NAMES
DR MARTIN ZATZ N.I.M.H. 36/2A-17, LCB, NIMH. BETHESDA MD	A 108 301-496-5590 SPEAKER 20892	
DR YAN ZHANG NORTHWESTERN UNIVERSITY NBP HOGAN HALL 2153 SHERIDAN RD. EVANSTON IL	A 301 708-491-5687 ATTENDEE 60208-3520	
DR WILLIAM F ZIMMERMAN AMHERST COLLEGE BIOLOGY DEPTARTMENT AMHERST COLLEGE AMHERST MA	A 302 413-542-2073 ATTENDEE 01002	
DR PIOTR ZLOMANCZUK WESLEYAN UNIVERSITY DEPARTMENT OF BIOLOGY WESLEYAN UNIVERSIT LAWN AVE MIDDLETOWN CT	A 309 203-347-9411 ATTENDEE 06459-0170	
DR IRVING ZUCKER UNIVERSITY OF CALIFORNIA PSYCHOLOGY DEPT BERKELEY CA	510-642-7136 DISC LDR 94720	

GORDON RESEARCH CONFERENCES

Gordon Research Conference on Chronobiology

August 9 - 13, 1993

Colby-Sawyer College (S), New London, N.H.

William J. Schwartz, Chair

Serge Daan, Vice-Chair

Monday Morning - 9:00 a.m. to 12:15 p.m.

Michael Rosbash (Brandeis Univ.), Discussion Leader
Transcriptional and Translational Mechanisms I

Takao Kondo (National Institute for Basic Biology, Myodaiji, Japan)
Prokaryotic circadian rhythms of gene expression reported by bacterial luciferase

Maria Mittag (Harvard Univ.)
Circadian control of gene expression in the bioluminescence system of the marine dinoflagellate *Gonyaulax polyedra*

Jon Kornhauser (Northwestern Univ.)
Light-activated signal transduction pathways in the suprachiasmatic nucleus

Monday Evening - 7:30 p.m. to 10:00 p.m.

Michael Young (Rockefeller Univ.), Discussion Leader
Transcriptional and Translational Mechanisms II

Jay Dunlap (Dartmouth Medical School)
Neurospora - the molecular identity of a clock gear and hand

Brigitte Frisch (Brandeis Univ.)
Elements of the *period* gene's cyclical expression in the *Drosophila* brain

Russell van Gelder (Stanford Univ.)
Circadian control of gene transcription in *Drosophila melanogaster*

Monday Commentary : Jerry Feldman (Univ. Calif., Santa Cruz)

Tuesday Morning - 9:00 a.m. to 12:15 p.m.

Arnold Eskin (Univ. Houston), Discussion Leader
Clocks in Culture

Gregory Cahill (Univ. Kansas Medical Center)
A circadian oscillator in vertebrate retinal photoreceptors

Gene Block (Univ. Virginia)
Cellular analysis of circadian rhythms in isolated neurons

David Earnest (Univ. Rochester Medical Center)
Establishment, characterization, and subcloning of immortalized cell lines derived from the rat suprachiasmatic nucleus

Tuesday Evening - 7:30 p.m. to 10:00 p.m.

J. Woodland Hastings (Harvard Univ.), Discussion Leader
Unfamiliar Clocks

Jaga Giebultowicz (U.S. Dept. Agriculture)
Circadian pacemaker in insect testis controls release and maturation of sperm

Dennis Liu (Univ. Washington)
Mutations affecting periodic behavior in *C. elegans*

Tuesday Commentary : Michael Menaker (Univ. Virginia)

Wednesday Morning - 9:00 a.m. to 12:15 p.m.

Serge Daan (Groningen Univ. Netherlands), Discussion Leader
Clocks *In Situ* - Input Mechanisms

Till Roenneberg (Univ. Munich)
Living with two clocks

Daniel Janik (Univ. Toronto)
Mechanisms of non-photic phase shifting

Charles Czeisler (Brigham and Women's Hospital)
Mechanisms of entrainment of the human circadian pacemaker

Wednesday Evening - 7:30 p.m. to 10:00 p.m.

Fred Turek (Northwestern Univ.), Discussion Leader
Clocks *In Situ* - Output Mechanisms

Rae Silver (Barnard College)

What do suprachiasmatic nucleus grafts really do?

G. Robert Lynch (Univ. Colorado)

The suprachiasmatic nucleus *in vitro*, melatonin, and seasonal behavior
in the Djungarian hamster

Wednesday Commentary : Colin S. Pittendrigh (Stanford Univ.)

Thursday Morning - 9:00 a.m. to 12:15 p.m.

Martha Gillette (Univ. Illinois), Discussion Leader
Suprachiasmatic Nucleus - New Tools

Phyllis Wise (Univ. Kentucky College of Medicine)

Use of antisense nucleotides to study the circadian clock

Michael Hastings (Univ. Cambridge, U.K.)

Functional domains of the suprachiasmatic nucleus

Anthony van den Pol (Yale Univ. School of Medicine)

Digital imaging of cellular behavior in the suprachiasmatic nucleus

Thursday Evening - 7:30 p.m. to 10:00 p.m.

Steven Reppert (Massachusetts Gen. Hosp.), Discussion Leader
Photoperiodic Mechanisms

Rüdiger Hardeland (Univ. Göttingen, Germany)

Photoperiodism at the cellular level: rhythms and effects of
indoleamines in *Gonyaulax polyedra*

Theresa Lee (Univ. Michigan)

Communication of photorefractoriness from mother to pups

Thursday Commentary : Robert Y. Moore (Univ. Pittsburgh)

Friday Morning - 9:00 a.m. to 12:00 p.m.

Irving Zucker (Univ. Calif., Berkeley), Discussion Leader
Temperature and Timekeeping

H. Craig Heller (Stanford Univ.)

Circadian rhythmicity in hibernating ground squirrels

Menno Gerkema (Univ. Groningen, Netherlands)

Synchronization of ultradian activity rhythms in common voles: the role of environmental temperature

Martin Zatz (Natl. Inst. Mental Health)

Thermal effects on melatonin rhythms in chick pineal cells

App. (D)

CHRONOBIOLOGY - COLBY SAWYER COLLEGE (S)
CONFERE COMMENT

SCIENCE:

1. Excellent scientifically and socially.
2. The conference was excellent, timely, and covered new developments.
3. A good conference with most papers at the cutting edge. As a plant biologist, I must say that it was a pity that there was only one talk on higher plants but this does reflect the fact that there are rather few people studying higher plant rhythm all this time.
4. Chronobiology conference excludes clinical research. Some lectures were too long or poor.
5. More papers on human rhythms and medical implications needed.
6. There seems to be a split between those involved in molecular techniques and those involved from a more biological/behavioral point of view. Maybe that will change with time.
7. It seems that several of the talks represented projects that are possibly promising and interesting, but have been presented in a far from convincing and complete format for the past (at least) 1.5 years. It seems that some quality control may be possible, or some way to communicate displeasure with presenters for their own quality control.

DISCUSSION:

8. Discussion/session leaders need to insure that all hear the questions and comments from the audience by a brief recap or restatement.

MANAGEMENT:

9. Poster sessions could be held in the evening after 6:30 p.m. and the evening talks in the afternoon.
10. Great conference. Good balance of topics (light on human). Easy to talk to people. Speakers were excellent. Poster were excellent. Dividing the posters into 4 sessions and leaving them up for two days was helpful. Hold the next chronobiology conference in Newport, R.I. on the beach!
11. I've been to all of the Gordon Conferences on chronobiology (one of 2 people) and thought that this had the best organization of all of them!
12. Some speakers were not well selected. Please speak at a moderate speed. Some speakers spoke too fast and non-natives could not catch up. Questions should be made using a microphone. We need several microphones among audiences.
13. Interdisciplinary mix was good. In a future meeting, I would like to see a sleep/rhythm mix. It would be good to try some poster discussion sessions allowing presenters 1 or 2 slides.
14. Mix it up. Why one whole day of molecular then nothing the rest of the conference?

CHRONOBIOLOGY - COLBY SAWYER COLLEGE (S)
CONFEREES COMMENTS

15. The meeting was unusually current and interactive. The chair promoted a relaxed pace combined with presentations of new, highly visible research findings. The combination was invigorating! Great job.
16. Goals, themes, objectives? I've never heard anyone actually state these. I'm not sure I'd want to. Poster sessions would be improved if even posters were one day, and odd posters the next instead of 1-13 and 14-26. This would take advantage of the entire room and reduce crowding.
17. As usual, a wonderful conference. This year's organizers were outstanding in putting together a high quality meeting.
18. There should have been more presentations per day or a shorter conference.
19. Lets go to Italy!
20. The morning session would be better if there were 2 speakers, then coffee, and then the final speaker, for attention span reasons. Overall, I like the structure of 3 morning speakers and 2 evening speakers and then a summary.
21. An excellent meeting! Probably the best "rhythms" meeting I've attended. The chair has put together an outstanding program, highlighting excellent work from many different labs, including many relative newcomers to the field. The speakers have been uniformly impressive, presenting new approaches and exciting new results.
22. Small group/subtopic meeting might be schedule on one evening.
23. I would have liked to receive abstracts of the posters.

ATMOSPHERE:

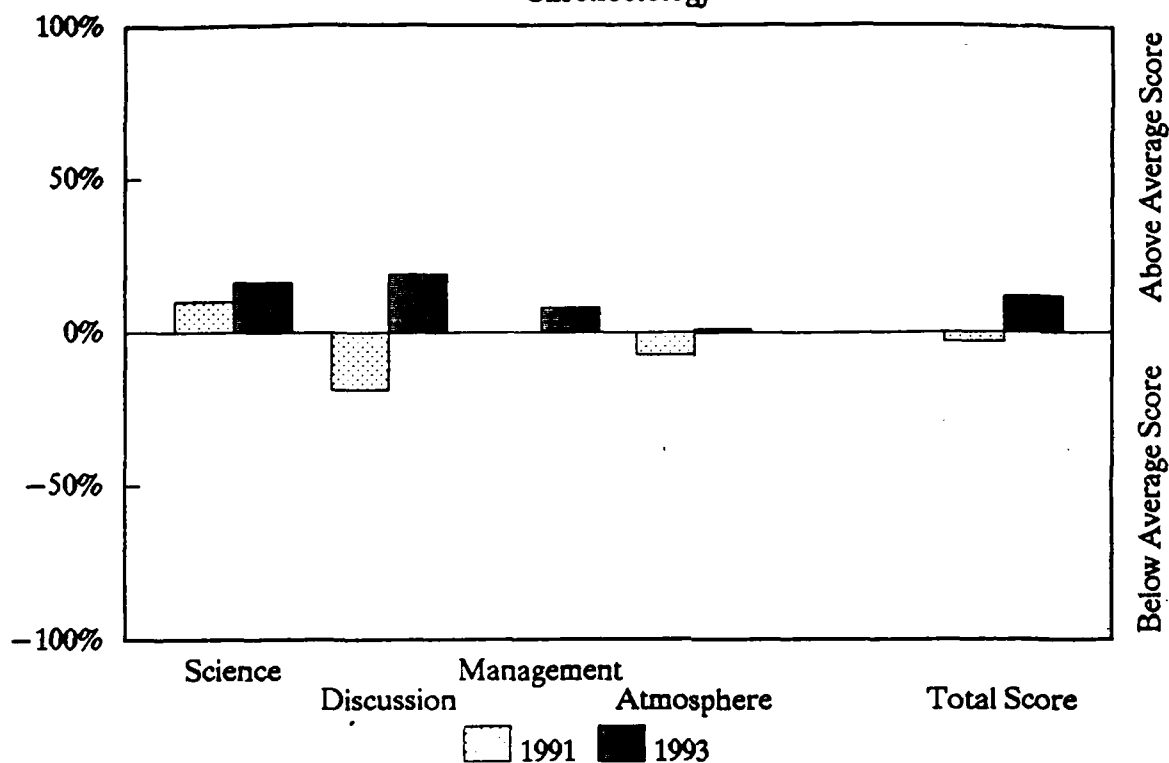
24. Great conference.
25. Excellent - The best chronobiology conference to date and all have been good.
26. Excellent.
27. Fantastic conference - the best of the several excellent chronobiology Gordon Conferences I have attended over the last 8 years, and more stimulating than G.C.s I have attended on other subjects.
28. This continues to be stimulating and very important to the field in spite of proliferation of related meetings (e.g. neuroscience, soc. study of biological rhythms).
29. This conference continues to attract the best scientists in the field and in increasing numbers. The meeting has played an important role in the development of the field, especially the interactions between U.S. and European workers.
30. The best Gordon Conference overall that I have attended (I've done 4).
31. Excellent conference! Very informative.

CHRONOBIOLOGY - COLBY SAWYER COLLEGE (S)
CONFEREES COMMENTS

32. In general, I am very happy to be here and I wish to attend this type of G.R.C. again and again.
33. The best conference that I have ever been to.

1993 Overall Conference Comparison

Chronobiology



CONFERENCE SCORES: Chronobiology

Conference Scores:	1993	1991	Average Conference Scores
Science:	25.45	24.13	21.93
Discussion:	20.27	13.85	17.08
Management:	15.74	14.56	14.56
Atmosphere:	15.83	14.48	15.61
Total Score:	77.29	67.02	69.19

Gordon Research Conferences

App. ②

GORDON CONFERENCE CHRONOBIOLOGY 1993

POSTER EXHIBITS

EXHIBIT A:

Posters up: Monday morning

Posters down: Wednesday morning

Monday 16:30-18:00:

Poster session A1, authors of posters A1-A13 present at their posters.

Tuesday 16:30-18:00:

Poster session A2, authors of posters A14-A26 present at their posters.

EXHIBIT B:

Posters up: Wednesday morning

Posters down: Friday morning

Wednesday 16:30-18:00:

Poster session B1, authors of posters B1-B13 present at their posters.

Thursday 16:30-18:00:

Poster session B2, authors of posters B14-B26 present at their posters.

GORDON CONFERENCE CHRONOBIOLOGY 1993

POSTERS

EXHIBIT A. (August 9-10)

- A-1 Michael T. Lewis, Jerry F. Feldman (University of California, Santa Cruz):
Comparative phylogenetic analysis of the *frq* (frequency) clock locus from several fungi reveals conserved and non-conserved regions.
- A-2 David K. Welsh, Diomedes E. Logothetis, Steven M. Reppert (Laboratory of Developmental Chronobiology, Massachusetts General Hospital; Dept. of Cardiology, Children's Hospital, Program in Neuroscience, Harvard Medical School, Boston):
Synaptic and nonsynaptic communication among cells cultured from rat suprachiasmatic nucleus.
- A-3 James Comolli, Walter Taylor, J.W. Hastings (Biological Laboratories, Harvard University, Cambridge, MA):
Inhibitor of protein phosphorylation lengthens *tau* and blocks light phase shifts in *Gonyaulax polyedra*.
- A-4 Marija Medanic, Martha U. Gillette (Department of Cell and Structural Biology, University of Illinois, Urbana, IL):
The mammalian circadian pacemaker shows bimodal sensitivity to regulation by neuropeptide-Y.
- A-5 S. Michel, K. Manivannan, J.J. Zaritzky, G.D. Block (Department of Biology, University of Virginia, Charlottesville, VA):
Whole cell currents in cultured circadian pacemaker neurons of *Bulla*.
- A-6 M. M. Moga, R. Y. Moore (Depts. of Psychiatry, Neurology, Behavioral Science and the Center for Neuroscience, University of Pittsburgh):
The paraventricular thalamic nucleus as a component of the circadian timing system in the rat.
- A-7 Bernard Possidente (Skidmore College, Saratoga Springs, NY):
Olfactory bulb role in a mouse circadian system.
- A-8 Wolfgang Puchalski, G. Robert Lynch (Dept. Biology, Wesleyan University, Middletown, Ct.):
Photoperiodic time measurement in Djungarian hamsters evaluated from T-cycle studies.
- A-9 Arcady A. Putilov (Biological Rhythms Research Lab. Institute of Physiology, Siberian Branch, Russ. Acad. of Med. Sciences, Novosibirsk, Russia):
A somnostat model can predict time course of slow wave activity during multiple sleep latency test.
- A-10 Martin Ralph, Diego Golombek, Gerry Honrado, Mark W. Hurd (Department of Psychology, University of Toronto):
Transgenic mice and circadian clocks: Fos-less and NGF Receptor-less, but not Timeless.

- A-11 O. van Reeth, Y. Zhang, M. Lesourd, F. W. Turek (Dept. Neurobiology & Physiology, Northwestern University, Evanston; Centre des Rythmes Biologiques, University of Brussels; Servier Company, Paris):
Chronic treatment with sulbutiamine can reverse some age-related changes in hamster's circadian rhythms.
- A-12 Alan Rosenwasser (Department of Psychology, University of Maine): Do presynaptic alpha-2 noradrenergic autoreceptors mediate circadian phase-shifting by clonidine ?
- A-13 Alan Rosenwasser (Department of Psychology, University of Maine):
Photic and non-photic phase-shifting associated with routine cage-maintenance.
- A-14 Martha W. Merrow, Jay C. Dunlap (Department of Biochemistry, Dartmouth Medical School, Hanover, NH):
Functional and molecular characterization of a homolog of *N. crassa* *frq*.
- A-15 François Rouyer (Dept. of Biology, Brandeis University, Waltham, MA)
Cloning of a circadianly regulated gene expressed in the head of *Drosophila melanogaster*.
- A-16 Norman F. Ruby, H.C. Heller (Dept. of Biological Sciences, Stanford University, Stanford, CA):
Low temperature shortens the period of circadian neuronal rhythms in the suprachiasmatic nucleus (SCN) of golden-mantled ground squirrels *in vitro*.
- A-17 Peter Ruoff (Rogaland University Center, Stavanger, Norway):
Temperature compensation in any reaction kinetic model of circadian oscillations.
- A-18 Kazuhiro Shimomura, Michael Menaker (Dept. of Biology, University of Virginia, Charlottesville VA 22901)
Effects of the *tau* Mutation on Circadian Phase Shifting by Light.
- A-19 Kathleen K. Siwicki, M.G. Folwell, W. Bug, P. Jacobs, K. Shinkai, Z. Verney, M. Bucan (Biology Department, Swarthmore College, Swarthmore, PA 19091)
Cellular rhythms in the PER antigen in *Drosophila* and *Manduca*.
- A-20 Junichi Takeuchi, William Shannon, Neil Anonin, William J. Schwartz (Department of Neurology, University of Massachusetts):
Compositional changes of AP-1 DNA-binding proteins are regulated by light in a mammalian circadian clock.
- A-21 Barbara Tate (Dept. of Psychiatry, Miriam Hospital, Providence, RI):
Circadian abnormalities induced by the Alzheimer beta-amyloid protein.
- A-22 N. Viswanathan, Fred C. Davis (Dept. of Biology, Northeastern University, Boston, Ma.):
Activation of dopaminergic system mediates maternal entrainment in hamsters.

- A-23 G. T. Wassmer, T. L. Page (Dept. of Biology, Vanderbilt University, Nashville, Tn.):
Photoperiodic regulation of a putative storage protein in the cockroach *Parcoblatta pennsylvanica*.
- A-24 E.T.Weber, M.U.Gillette (Department of Physiology, University of Illinois, Urbana, Ill.):
Identification of protein kinase G as an SCN substrate for phosphorylation during the circadian cycle.
- A-25 C. R. McClung, Z. R. Liu, E. A. Pease, M. L. Pilgrim, H. H. Zhong ():
Circadian and light regulated gene expression in *Arabidopsis*.
- A-26 Daniel F. Kripke (University of California, San Diego, La Jolla):
Human light exposure and its correlates.

EXHIBIT B (August 11-12)

- B-1 P. Badhakchani, N. W. S. Chong, C. Coen, K. Marsden, J. F. Powell, I. C. Campbell (Institute of Psychiatry and King's College, London, U.K.):
Circadian studies of rat SCN: temporal differences in mRNA expression.
- B-2 N. W. S. Chong, P. Badhakchani, C. Coen, K. Marsden, J. F. Powell, D. Sugden, I. C. Campbell (Institute of Psychiatry and King's College, London, U.K.):
Differential expression of an mRNA in chick pineal over 24 hours.
- B-3 Ivonne Balzer (Zoological Institute, University of Göttingen, Germany):
Circadian rhythmicity of encystment and excystment in *Gonyaulax polyedra*.
- B-4 Stephany M. Biello, N. Mrosovsky (Depts. of Zoology and Physiology, Univ. of Toronto, Ont. Canada M5S 1A1)
Antiserum to neuropeptide-Y attenuates phase shifts in response to induced wheel running.
- B-5 Pamela J. Carter, Malcolm B. Wilkins, Hugh G. Nimmo, Charles A. Fewson (Dept. of Botany and Biochemistry, Glasgow University, Glasgow G12 8QQ, U.K.):
Temperature regulation of phospho-enol-pyruvate carboxylase activity in relation to the circadian rhythm of CO₂ exchange in *Bryophyllum* leaves and the temperature compensation of the period.
- B-6 Patricia J. DeCoursey, C. Sandlin, S. Pius, C. Herrin (University of South Carolina, Dept. of Biological Sciences, Columbia SC):
Relationship of Circadian Temperature Cycles and Activity Rhythms in Rodents.
- B-7 A. Diez-Noguera, A. Campuzano, J. Vilaplana, T. Cambras (Laboratori de Fisiologia, Facultat de Farmacia, Universitat de Barcelona):
Effects of period length of light/dark cycles in the circadian rhythms of motor activity and in the growth rate of young Wistar rats.

- B-8 Takashi Ebisawa, Yukiko Sasaki, Takeo Deguchi (Lab. of Developmental Chronobiology, Massachusetts Gen Hospital, Boston, USA):
Complementary DNA's for Two Arylamine N-Acetyltransferases with Identical 5'-Noncoding Region from Rat Pineal Gland.
- B-9 Isaac Edery (Dept. of Biology, Brandeis University, Waltham, MA)
Temporal Phosphorylation of the Drosophila Period Protein.
- B-10 Jeffrey A. Elliott, Colin S. Pittendrigh (Dept. Psychiatry, U.C. San Diego):
Phase relationship of evening and morning oscillators regulates amplitude of hamster PRC to light.
- B-11 Beatriz Fuentes-Pardo, M. Lara-Aparicio, S. López de Medrano (Departamento de Fisiología, Facultad de Medicina, Instituto de Matemáticas Universidad nacional Autónoma de México, México 04510, MÉXICO)
Mathematical simulation of the action of external stimuli on the circadian rhythm of electroretinogram of crayfish.
- B-12 Menno P. Gerkema, Eddy A. van der Zee, Louis E. Feitsma (Zoology Laboratory and Department of Animal Physiology, Groningen University):
The number of arginine-vasopressin immunoreactive cells in the SCN correlates with the degree of expression of circadian rhythmicity in common voles, *Microtus arvalis*.
- B-13 M.E.Geusz, S.Michel, G.D.Block (Department of Biology, University of Virginia, Charlottesville, VA):
Intracellular calcium responses of circadian pacemaker neurons measured with fura-2.
- B-14 R. Keith Barrett, Joseph S. Jakahashi ((NSF Center for Biological Timing, Dept. of Neurobiology and Physiology, Northwestern University, Evanston IL 60208)
Temperature compensation of the chick pineal circadian clock.
- B-15 Mona Castel (Department of Cell and Animal Biology, Hebrew University of Jerusalem):
Organotypic culture of the suprachiasmatic nucleus, particularly the GABA-ergic innervation.
- B-16 Van D. Gooch, J. C. Thoen (Division of Science & Math, Univ. Minnesota, Morris Mn):
Time lapse video of circadian conidiation in *Neurospora*.
- B-17 P.Hardin (Department of Biology, Texas A & M University, College Station, Texas):
Circadian cycling of *period* mRNA is correlated with nuclear localization of *period* protein.
- B-18 J. P. Harney, K. Scarborough, K. Rosewell, P. M. Wise (Department of Physiology, University of Kentucky College of Medicine, Lexington, KY; Department of Neurobiology and Physiology, Northwestern University, Evanston, IL):
Effect of intracranial infusion of VIP antisense oligonucleotides into the suprachiasmatic nuclei (SCN) on the LH surge in the rat.

- B-19 Michaela Hau (Max Planck Institut für Verhaltensphysiologie, Andechs, Germany):
Entrainment of house sparrow circadian rhythms to feeding cycles with different food access times.
- B-20 Sabine Heigl (Max Planck Institut f. Verhaltensphysiologie, Abt. Gwinner, Andechs, Germany)
Periodic food availability entrains circadian rhythms in pinealectomized house sparrows.
- B-21 Martha Hotz Vitaterna, Phil L. Lowrey, David McDonald, William F. Dove, Lawrence H. Pinto, Fred W. Turek, Joseph S. Takahashi (NSF Center for Biological Timing, Department of Neurobiology and Physiology, Northwestern University, Evanston, IL; McArdle Laboratory for Cancer Research, University of Wisconsin Medical School, Madison, WI):
Identification of a circadian clock mutant in the mouse.
- B-22 Norio Ishida, Miwa Matsui, Youji Mitsui (National Institute of Bioscience and Human Technology, AIST, MITI, Tsukuba Science City 305, Japan):
Circadian and light regulation of pp2.5 mRNA in the Suprachiasmatic Nucleus of rat brain.
- B-23 Janet E. Joy (NIMH Neuroscience Center at Saint Elizabeths, Washington, D.C.):
Proteins associated with the maturation of the circadian clock in the reproductive tract of the male Gypsy moth.
- B-24 S.B.S.Kalsa, D.Whitmore, B.Bogart, G.D.Block (Department of Biology, University of Virginia, Charlottesville, VA):
Evidence for direct involvement of transcription in the timing mechanism of a circadian pacemaker.
- B-25 Hak Yong Kim, Gary G. Coté, Richard C. Crain (Dept. of Molecular and Cell Biology, Univ. of Connecticut, Storrs, CT):
Circadian rhythmic regulation of light-responsive potassium channels in protoplasts from *Samanea saman* pulvini.

A-27 MOUSE MUTANT WITH ALTERED CIRCADIAN RHYTHM: PRELIMINARY
BEHAVIORAL AND GENETIC ANALYSIS

Gary E. Pickard^{1,2,5}, Patricia J. Sollars^{1,5}, Eugene M. Rinchik⁶, Allan I. Pack^{3,5} and
Maja Bucan^{1,4,5}

Departments of Psychiatry¹, Neuroscience², Medicine³ and Genetics⁴, Center for Sleep
and Respiratory Neurobiology⁵, University of Pennsylvania School of Medicine,
Philadelphia, PA and Division of Biology⁶, Oak Ridge National Laboratory, Oak Ridge,
TN.

A-28 THE USE OF DIFFERENTIAL DISPLAY IN THE ANALYSIS OF GENE
EXPRESSION IN SCN

Patrick Nolan¹, Patricia J. Sollars^{1,4}, Kathy Siwicki⁵, Gary E. Pickard^{1,2,4} and Maja
Bucan^{1,3,4}

Departments of Psychiatry¹, Neuroscience², and Genetics³, Center for Sleep and
Respiratory Neurobiology⁴, University of Pennsylvania School of Medicine, Philadelphia,
PA and Department of Biology⁵, Swarthmore College, Swarthmore, PA.

B-26 Michael Roberts - "Nitric Oxide Synthase
in the eye of Bulla:"

B-27 Piotr Zlomanczuk "Melatonin
sensitivity in SCN
neurons in
Djungarian hamsters
exposed to constant
light"